

## A NEW SPECIES IN THE WOLF SPIDER GENUS *ALLOTROCHOSINA* FROM NEW SOUTH WALES, AUSTRALIA (ARANEAE, LYCOSIDAE)

**Volker W. Framenau:** Department of Terrestrial Invertebrates, Western Australian Museum, Welshpool D.C., Western Australia 6986, Australia.  
E-mail: volker.framenau@museum.wa.gov.au

**ABSTRACT.** The venoniine wolf spider genus *Allotrochosina* Roewer 1960 currently includes two species, *A. schauinslandi* Simon 1899 from New Zealand (type species) and *A. karri* Vink 2001 from Western Australia. A third species of this genus, *A. walesiana* new species from New South Wales, Australia, is here described. Some differences in genital morphology of *A. walesiana* in comparison to *A. schauinslandi* and *A. karri* in combination with a misinterpretation of genitalic characters in previous treatments of the genus require a new diagnosis for *Allotrochosina*. The genus is characterized by the presence of a distinct apical process on the embolic division of the male pedipalp. *Allotrochosina walesiana* appears to be winter mature since adult spiders have only been found between June and October. Additional records of *A. karri*, which was previously only known from the type locality, Crowea in southwest Western Australia, extend the known distribution by more than 600 km to the North.

**Keywords:** Venoniinae, New Zealand, Western Australia, generic diagnosis

The venoniine wolf spider genus *Allotrochosina* Roewer 1960 was recently revised to include two species, *A. schauinslandi* Simon 1899 from New Zealand (type species) and *A. karri* Vink, 2001 from Western Australia (Vink 2001). *Allotrochosina* was then diagnosed by a combination of genitalic characters, such as the lack of bristles on the cymbium tip of the male pedipalp and an elongated subtegulum that is situated along the prolateral margin of the cymbium (Vink 2001). However, one of the key genitalic characters that Vink (2001) listed for *Allotrochosina*, “embolus and terminal apophysis reduced and crowded together at tip of genital bulb,” was based on a misinterpretation of the morphology of the male pedipalp. The structure labeled as embolus (Vink 2001, figs. 2 & 8) is an apical process on the embolic division of the genital bulb. The actual embolus originates centrally on the embolic division and curves basally around it (Figs. 7, 8). Vink’s (2001) terminal apophysis that he placed somewhere prolaterally on the embolic division does not conform to the structure that is usually referred to as “terminal apophysis” in lycosid morphology. The true terminal apophysis (“synembolus” in Zyuzin 1993; see also Framenau 2006) is usually a retrolateral, sclerotized structure on the embolic division that may protect the embolus

in resting position or guide it during copulation (Figs. 4, 7, 8).

The aim of this study is to provide an updated diagnosis for the genus *Allotrochosina* incorporating new interpretations of its male genital structures and to describe a new species in this genus, *A. walesiana* sp. nov. The distribution of *A. karri*, a species that was previously only known from the type locality in southwest Western Australia, is updated.

### METHODS

This study forms part of a revision of Australian wolf spiders that is based on a comprehensive examination of all wolf spider material lodged in Australian museums (ca. 20,000 records). Descriptions are based on specimens preserved in 70% ethanol. The epigynum of the paratype female was prepared for examination by submersion in lactic acid for 2 hrs. For clarity, the illustrations of male pedipalps and female epigyna omit the setae. The morphological nomenclature follows Framenau (2006) and, in case of female genitalia, Sierwald (2000). All measurements are given in millimeters (mm).

The photograph of the holotype of *A. walesiana* was taken with a digital camera (G6; Canon Inc., Japan) that was connected to the optical tube of a stereo microscope

(MZ6; Leica Microsystems GmbH, Wetzlar, Germany) with an optical adapter set (Max-View™ Plus; Scopetronix, Cape Coral, Florida, USA). Nine photographs were taken in different focal planes and combined with the software package Helicon Focus 4.0.9 (Khmelik & Kozub 2006).

**Abbreviations.**—*Morphology*: TL, total length; CL, CW, cephalothorax length and width; AL, AW, abdomen length and width; AE, PE anterior and posterior eyes; AME, ALE anterior median and lateral eyes; PME, PLE, posterior median and lateral eyes. *Institutions*: AM, Australian Museum (Sydney); QM, Queensland Museum (Brisbane); WAM, Western Australian Museum (Perth).

## SYSTEMATICS

Family Lycosidae Sundevall 1833

Subfamily Venoniinae Lehtinen & Hippa 1979

*Allotrochosina* Roewer 1960

*Allotrochosina* Roewer 1960:927–928 (first listed as *nomen nudum* in Roewer 1955:213).

**Type species.**—*Lycosa maunganuiensis* Berland 1925, by monotypy [junior synonym of *Lycosa schauinslandi* Simon 1899; first synonymized by Vink (2001)].

**Diagnosis.**—*Male*: Macrosetae or bristles at cymbium tip absent; pedipalp tibia length subequal to length of cymbium; embolic division of male pedipalp reduced (flattened), i.e., palea absent (as in all genera of the subfamily Venoniinae sensu Lehtinen & Hippa (1979) (Framenau 2006; Yoo & Framenau 2006)); embolic division with an apical process that is directed retrolaterally (Figs. 4, 7, 8). *Female*: Genital openings extend posteriorly from epigynal area (see Vink 2001) or lateral epigynum margins extending past median septum (Fig. 5); pedipalp tibiae and tarsi subequal in length.

**Remarks.**—Vink (2001) attributed *Allotrochosina* to the Venoniinae based on an expanded definition of this subfamily by Dondale (1986). One of Dondale's (1986) synapomorphies of the Venoniinae was "embolus small, situated distally;" however, it has been shown recently that the embolus in species of *Venonia* Thorell 1894, the type genus of the subfamily, originates prolaterally and curves ventrally around the embolic division challenging Dondale's (1986) concept of the subfamily (e.g.,

Zyuzin 1993; Yoo & Framenau 2006, fig. 17D). Hence, Vink's (2001) misinterpretation of the embolus placed *Allotrochosina* in a subfamily Venoniinae sensu Dondale (1986) that itself was based on a misinterpretation of genital characters. Curiously, the placement of *Allotrochosina* in the Venoniinae sensu Lehtinen & Hippa 1979 was recently supported by molecular and morphological data (Murphy et al. 2006; Yoo & Framenau 2006). Similarities in particular in the embolic division of the male pedipalp support close relationships of *Allotrochosina* and the venoniine genera *Venonia* and *Anomalosa* Roewer 1960.

**Included species.**—*Allotrochosina schauinslandi* Simon 1899 (type species), *Allotrochosina karri* Vink 2001, *Allotrochosina walesiana* sp. nov.

**Distribution.**—Australia (New South Wales, Western Australia) and New Zealand.

*Allotrochosina walesiana* new species

(Figs. 1–6, 9)

**Types.**—AUSTRALIA: *New South Wales*: Holotype male, Raspberry Trap Cave, Billy's Creek, 34°06'13"S, 150°07'50"E, 22 June 1995, cave BC9-7 transition zone, S. Eberhard (AM KS53940). Paratype: 1 female, Hazelbrook, Railway Parade, 33°43'55"S, 150°27'00"E, 3 October 1996, pitfall trap, Australian Museum Business Services (AMBS), site M4 C43 (AM KS51825).

**Other material examined.**—AUSTRALIA: *New South Wales*: 1 ♂, 2 ♀, Blue Mountains National Park, Binnowie Drive, 33°40'15"S, 150°27'55"E, 15 August 1996 (AM KS51843–4); 1 ♂, Gordon, 33°44'S, 151°09'E, C. Horseman, 12 May 1983–9 June 1983, open *Eucalyptus* forest (AM KS12403); 1 ♀, Hazelbrook Coates Park, 33°43'45"S, 150°26'45"E, 22 August 1996 (AM KS51845); 2 ♂, 5 ♀, Hazelbrook, Railway Parade, 33°43'55"S, 150°27'00"E, 3 October 1996 (KS51829–30, KS52071–3, KS52075); 5 ♂, Hazelbrook, Winbourne Road, 33°43'20"S, 150°27'35"E, 3 October 1996 (AM KS52082–4, KS52087, KS53945); 1 ♂, 1 ♀, Woodford, Ridge Street, 33°43'50"S, 150°28'40"E, 30 September 1996 (AM KS53955–6).

**Diagnosis.**—Apical process of embolic division in male pedipalp of *A. walesiana* (Fig. 4) much longer than in *A. schauinslandi* or *A. karri* (Figs. 7, 8). Lateral margins of female epigy-



Figure 1.—Holotype male of *Allotrochosina walesiana* from Raspberry Trap Cave, New South Wales (AM KS 53940). The body length of this specimen is 8.13 mm.

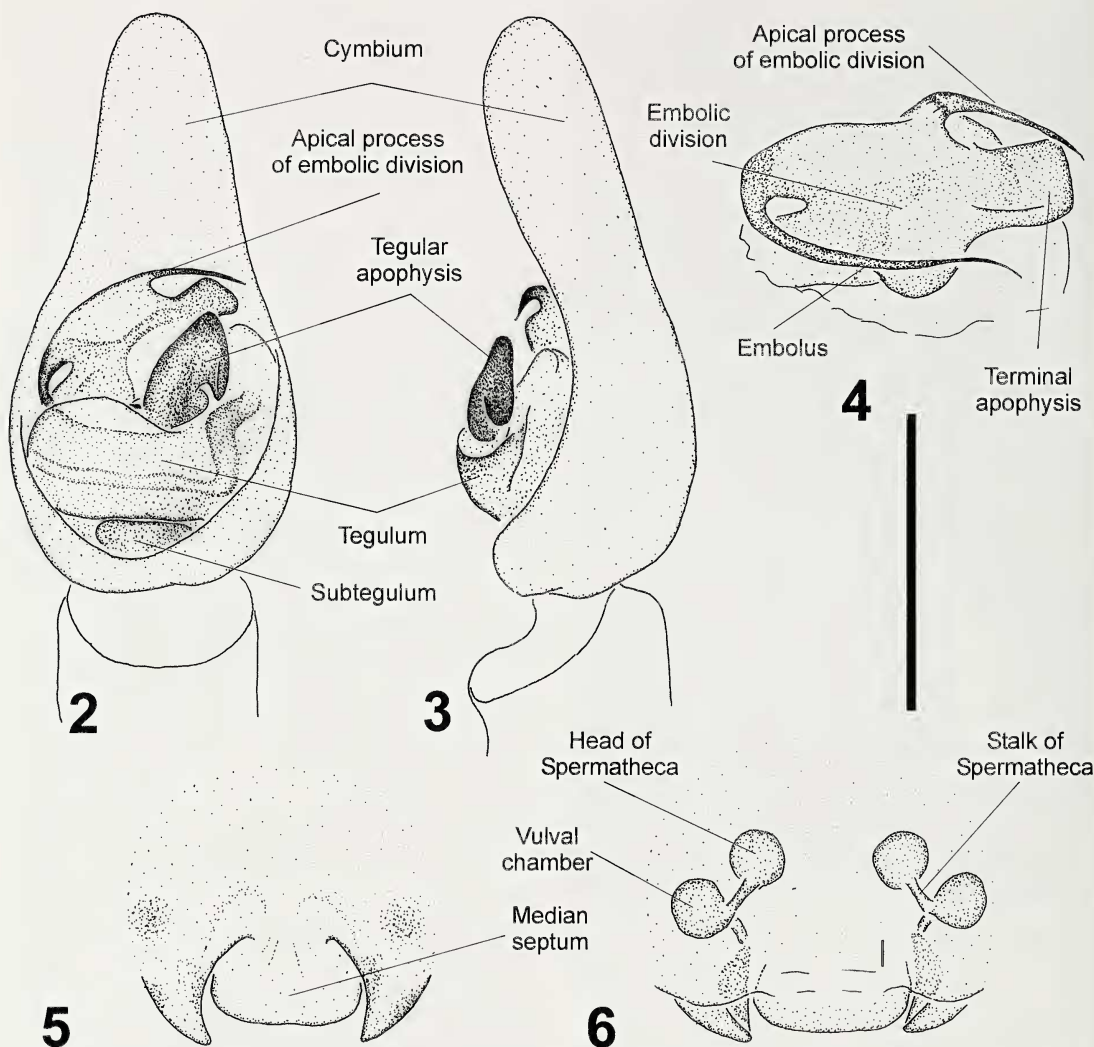
num reaching past the posterior border of median septum in *A. walesiana* (median septum reaches past lateral epigynal margins in *A. schauinslandi* and *A. karri* (see Vink 2001, figs. 4, 10).

**Description.**—*Male* (based on holotype, AM KS53940): carapace: dorsal profile straight in lateral view; overall light brown with two faint, short longitudinal light bands in anterior half; faint traces of light submarginal bands; carapace margins darker (Fig. 1); mainly covered with dark brown setae, some white setae in longitudinal bands; black macrosetae in anterior half between fovea and eyes and around eyes; one long brown bristle between AME, six long brown bristles below AE; clypeus height about one diameter of AME. Eyes: row of AE longer than row of PME; row of AE slightly procurved. Sternum: orange-brown; covered

with brown macrosetae, which are longer towards the margins. Labium: dark brown; front end truncate and white. Chelicerae: brown; brown bristles basally, otherwise long silvery setae; three retromarginal teeth, with the median largest; two promarginal teeth, with the apical larger. Pedipalp (Figs. 2–4): tegular apophysis forms an apically extended, basally directed hook; embolus long and slender with its tip pointing slightly basally, apical process of embolic division long and slender (Fig. 4). Abdomen: olive-grey with yellow lanceolate cardiac mark in anterior half, additional yellow patches and chevrons beside cardiac mark and in posterior half of abdomen (Fig. 1); covered with brown setae and macrosetae; venter yellow-brown, somewhat olive-grey mottled centrally; spinnerets brown. Legs: leg formula  $IV > I > II > III$ ; brown, with very faint darker annulations; spination of leg I: femur: 3 dorsal (apical small), 1 apicoprolateral; 1 (small) retrolateral; tibia: 3 ventral pairs, 2 prolateral, 1 retrolateral (left leg only); metatarsus: 3 ventral pairs, 1 retrolateral, 1 apicoventral, 1 apicoprolateral, 1 apicoretrolateral.

*Female* (based on paratype, AM KS51825): carapace, eyes, sternum and labium as male. Chelicerae: coloration and setae as male; three promarginal teeth with the median largest, three (two on left chelicera) with the median (apical) largest. Epigynum (Figs. 5, 6): ventral view: lateral margins reaching posteriorly past median septum (Fig. 5); dorsal view: round spermathecal heads and thin spermathecal stalks; large, round vulval chamber (Fig. 6). Abdomen as male. Legs: leg formula  $IV > I > II > III$ ; brown, apical segments somewhat darker; spination of leg I: femur: 3 dorsal (apical small), 1 apicoprolateral, 1 (small) retrolateral; tibia: 3 ventral pairs; metatarsus: 3 ventral pairs, 1 apicoventral.

**Measurements:** male holotype (female paratype): TL 8.13 (7.75), CL 4.38 (4.38), CW 3.25 (3.13). Eyes: AME 0.13 (0.15), ALE 0.12 (0.13), PME 0.27 (0.29), PLE 0.23 (0.21). Row of eyes: AE 0.75 (0.79), PME 0.71 (0.73), PLE 1.13 (1.19). Sternum (length/width) 2.00/1.81 (2.00/1.63). Labium (length/width) 0.77/0.63 (0.83/0.63). AL 3.75 (3.25), AW 2.25 (2.63). Legs: lengths of segments (femur + patella/tibia + metatarsus + tarsus = total length): Pedipalp 1.88 + 1.75 + — + 1.36 = 4.99; leg I 3.63 + 4.88 + 3.25 + 1.75 = 13.51; leg II 3.38 + 4.88 + 2.88 + 1.63 = 12.77; leg III 3.38 + 3.88 + 3.13 + 1.50 =



Figures 2–6.—*Allotrochosina walesiana* sp. nov. Holotype male from Raspberry Trap Cave, New South Wales (AM KS 53940): 2. Left pedipalp, ventral; 3. Left pedipalp, retrolateral. Male from Hazelbrook, Winbourne Road, New South Wales (AM KS52087); 4. Embolic division of bulb. Female paratype from Hazelbrook, Railway Parade (AM KS51825); 5. Epigynum, ventral view; 6. Epigynum, dorsal view. Scale bar: (2, 3) 0.70 mm, (4) 0.39 mm, (5, 6) 0.50 mm.

11.89; leg IV 4.13 + 5.25 + 4.75 + 2.00 = 16.13 (Pedipalp 1.75 + 1.75 + — + 1.13 = 4.63; leg I 3.50 + 4.13 + 2.75 + 1.63 = 12.01; leg II 3.13 + 3.75 + 2.38 + 1.50 = 10.76; leg III 2.88 + 3.25 + 2.63 + 1.38 = 10.14; leg IV 4.13 + 5.00 + 4.25 + 2.00 = 15.38).

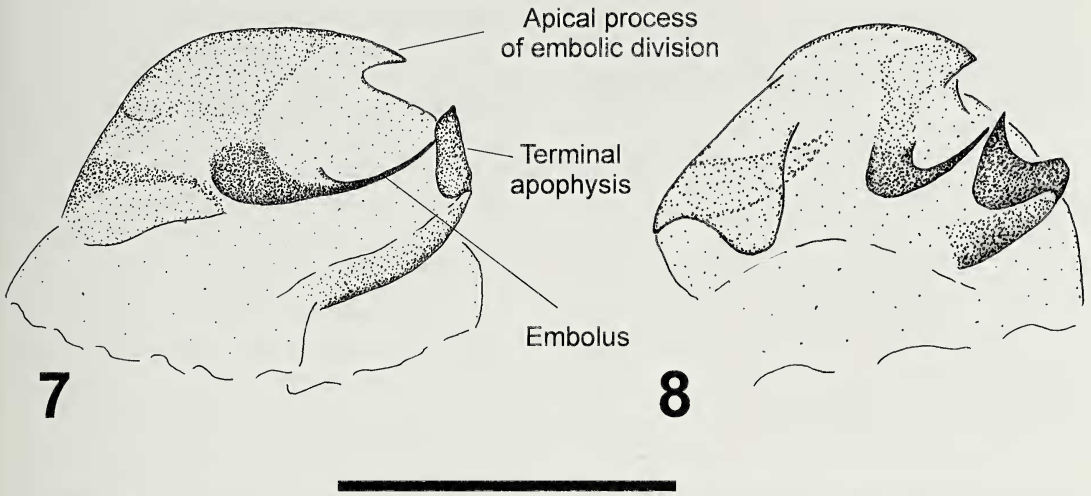
**Variation:** ♂ (♀) (range, mean ± SD): TL 5.63–7.25, 6.73 ± 0.58; CL 3.25–3.88, 3.59 ± 0.23; CW 2.25–2.75, 2.51 ± 0.22;  $n = 8$  (TL 6.13–10.50, 7.92 ± 1.40; CL 3.50–5.00, 4.14 ± 0.58; CW 2.50–3.50, 2.94 ± 0.35;  $n = 8$ ).

**Life cycle and habitat preferences.**—*Allotrochosina walesiana* appears to be winter mature,

as adult males and female were collected only between June and October. Not much is known about the habitat preferences of this species; the only information available is that two specimens were from a “transition zone of cave” and “open *Eucalyptus* forest.”

**Distribution.**—*Allotrochosina walesiana* is only known from a very small range around Sydney in New South Wales (Fig. 9).

**Etymology.**—The specific epithet is an adjective in apposition referring to New South Wales, the Australian state where this species has been found.



Figures 7–8.—*Allotrochosina schauinslandi* Simon (1899). Male from Fox Glacier, New Zealand (WAM T40667): 7. Embolic division of bulb. *Allotrochosina karri* Vink, 2001: Male Turtle Creek, Western Australia (WAM T53823); 8. Embolic division of bulb. Scale bar: (7) 0.30 mm, (8) 0.17 mm.

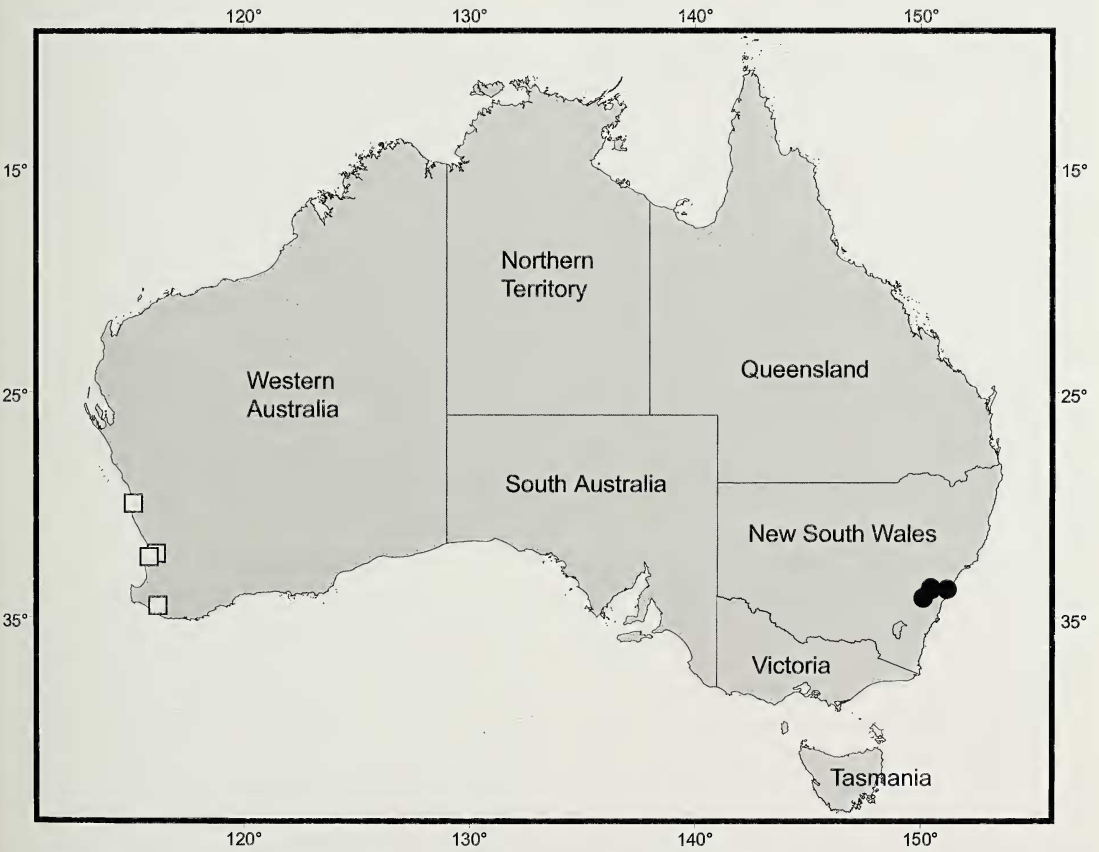


Figure 9.—Distribution records of *Allotrochosina walesiana* sp. nov. (●) and *Allotrochosina karri* Vink, 2001 (□).

*Allotrochosina karri* Vink 2001

(Fig. 7)

*Allotrochosina karri* Vink 2001:464–466, figs. 7–11.

**Types.**—AUSTRALIA: *Western Australia*: Holotype male, Crowea, 34°28'S, 116°10'E, week ending 31 December 1977, creek site, S.J. Curry (WAM 99/114). Allotype: 1 female, Crowea, 34°28'S, 116°10'E, 20 October 1979, creek site, open (regrowth) forest, site 4A, 8/4, S.J. Curry (WAM 88/2719). Paratypes: 41 males, 13 females, Crowea, 34°28'S, 116°10'E (WAM 99/110–3, 99/115–63) (detailed collection data of all paratypes in Vink 2001). All types examined.

**Other material examined.**—AUSTRALIA: *Western Australia*: 1 ♀, Crowea, 34°28'S, 116°10'E, 13 December 1979, S.J. Curry, creek site, area A, 7/4 (WAM 88/2720); 1 ♀, Mt Lindesay National Park, 34°50'55"S, 117°17'56"E, 20 October 2006, M.L. Moir, J.M. Waldoock, site LIND05, under sawgrass litter (WAM T77388); 1 ♀, Stockyard Cave, near Eneabba, 29°56'S, 115°06', 27 January 1974, J. Lowry, E3, cave, near entrance (AM KS7930); 1 ♀, same locality, 26 January 1974, J. Lowry, E3, Lowry ref. no. 4/126, cave (AM KS7925); 1 ♂, 1 ♀, Stockyard Cave, Stockyard Gully, 29°56'S, 115°06'E, 17 May 1969, J. Lowry (QM W6157–8); 1 ♂, Turtle Creek, Base of Canning Dam, 32°01'16"S, 116°07'07"E, 26 August 2003, V. W. Framenau, wet litter in riparian zone (WAM T53823); 1 ♀, White Lake (= Lake Cooloongup), 32°18'S, 115°47'E, 10 February 1952, B.Y. Main (WAM T65070).

**Diagnosis.**—Most similar to *A. schauinslandi*, but considerably smaller (TL ca. 2.0–5.0 versus ca. 6.0–10.0); in males leg IV longest (leg I longest in *A. schauinslandi*); spermathecal stalks with 90° bend (coiled in *A. schauinslandi*) (Vink 2001).

**Description.**—Vink (2001) provided a detailed description of males and females of *A. karri*. Here, I illustrate the embolic division of the male pedipalp to illustrate the proper position of embolus and the apical process (Fig. 7).

**Life cycle and habitat preferences.**—Mature *A. karri* have been found all year round, including late autumn and winter. Recent records support previous assumptions that this species prefers damp habitats (Vink 2001), as it has mainly been collected near creeks and in gullies.

**Distribution.**—*Allotrochosina karri* was originally only known from the type locality, Crowea in the southwest of Western Australia. A comprehensive examination of Australian lycosid collections, in particular that of the WAM, showed that this species is more common than previously thought and its known range can be extended more than 600 km to the north (Fig. 9).

## DISCUSSION

The genital morphology of *A. walesiana* differs in some aspects from *A. schauinslandi* and *A. karri*, both of which display very uniform genitalic traits. The apical process of the embolic division is much longer in *A. walesiana* and the origin of the embolus is prolateral on the embolic division (Fig. 4), whereas the embolus originates centrally in *A. schauinslandi* and *A. karri* (Figs. 7, 8). The female epigyna in the latter two species are very similar to each other with the median septum forming a posterior lip that reaches beyond the posterior margin of the epigynum. In contrast, the lateral borders of the epigynum reach beyond the median septum in *A. walesiana* and a large vulval chamber is present. However, overall similarities of somatic (e.g., coloration, eye pattern) and genitalic characters (flattened shape of embolic division, shape of tegular apophyses and internal female genitalia) leave no doubt that *A. walesiana* belongs to the genus *Allotrochosina*. The inclusion of the somewhat derived *A. walesiana* in this genus and new interpretations of male genitalic structures in comparison to Vink's (2001) review of the genus required a modification of the generic diagnosis of *Allotrochosina* as presented above. Most distinctive and unique for the genus is the apical process of the embolic division.

## ACKNOWLEDGMENTS

I am indebted to Graham Milledge (AM) for the loan of the material of *A. walesiana* and together with Helen Smith for their hospitality and regular morning teas and cakes when visiting the Australian Museum. Barbara Baehr, Robert Raven and Owen Seeman (QM) provided accommodation and logistic support when I visited their institution in Brisbane. Cor Vink donated material of *A. schauinslandi* to the WAM, on which part of this study is based. Mariella Herberstein,

Lucille Sebastian, Sheila and Liesl Baldock, Thomas Becker, and Jens and Diana Sommer-Knudsen provided accommodation during my stays in Sydney. Jens' selection of Single Malt Scotch whisky is remarkable. Melissa Thomas, Jung-Sun Yoo, Robert Raven and Cor Vink provided helpful comments on earlier drafts of the manuscript. This study forms part of a revision of Australian wolf spiders funded by the Australian Biological Resources Study (ABRS) to Mark Harvey (Western Australian Museum) and Andy Austin (The University of Adelaide).

## LITERATURE CITED

- Dondale, C.D. 1986. The subfamilies of wolf spiders (Araneae: Lycosidae). *Actas X Congreso Internacional de Aracnología, Jaca, España* 1:327–332.
- Framenau, V.W. 2006. Revision of the Australian wolf spider genus *Anomalosa* Roewer, 1960 (Araneae: Lycosidae). *Zootaxa* 1304:1–20.
- Khmelik, V.V. & D. Kozub. 2006. *Helicon Focus 4.0.9*. Helicon Soft Ltd, Kharkov, Ukraine. Online at: <http://HeliconFocus.com> (accessed 11 January 2007).
- Lehtinen, P.T. & H. Hippa. 1979. Spiders of the Oriental-Australian region. I. Lycosidae: Venoniinae and Zoicinae. *Annales Zoologici Fennici* 16:1–22.
- Murphy, N.P., V.W. Framenau, S.C. Donnellan, M.S. Harvey, Y.-C. Park & A.D. Austin. 2006. Phylogenetic reconstruction of the wolf spiders (Araneae: Lycosidae) using sequences from the 12S rRNA, 28S rRNA, and NADH1 genes: implications for classification, biogeography, and the evolution of web building behavior. *Molecular Phylogenetics and Evolution* 38:583–602.
- Roewer, C.F. 1955 [imprint date 1954]. *Katalog der Araneae von 1758 bis 1940*. Vol. 2a. Institut Royal des Sciences Naturelles de Belgique, Bruxelles. 923 pp.
- Roewer, C.F. 1960 [imprint date 1959]. *Araneae Lycosaeformia II (Lycosidae) (Fortsetzung und Schluss)*. *Exploration du Parc National de l'Upemba—Mission G. F. de Witte* 55:519–1040.
- Sierwald, P. 2000. Description of the male of *Sosippus placidus*, with notes on the subfamily Sosippinae (Araneae, Lycosidae). *Journal of Arachnology* 28:133–140.
- Vink, C.J. 2001. A revision of the genus *Allotrochosisina* Roewer (Lycosidae: Araneae). *Invertebrate Taxonomy* 15:461–466.
- Yoo, J.-S. & V.W. Framenau. 2006. Systematics and biogeography of the sheet-web building wolf spider genus *Venonia* (Araneae: Lycosidae). *Invertebrate Systematics* 20:675–712.
- Zyuzin, A.A. 1993. Studies on the wolf spiders (Araneae: Lycosidae). I. A new genus and species from Kazakhstan, with comments on the Lycosinae. *Memoirs of the Queensland Museum* 33:693–700.

*Manuscript received 14 January 2007, revised 22 March 2007.*